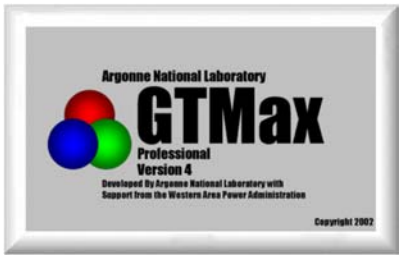
ARGONNE NATIONAL LABORATORY

Center for Energy, Environmental & Economic Systems Analysis (CEEESA)

GTMax - Argonne's New Deregulated Power Market Analysis Tool

Opportunity: In many countries, the trend toward restructuring, privatization, and deregulation is fundamentally changing the way electricity markets are functioning. Markets are unbundled and new market agents are entering the arena. In the new system, agents have access to a new range of products and instruments, including firm and non-firm contracts, spot market transactions, and emergency intertie agreements.

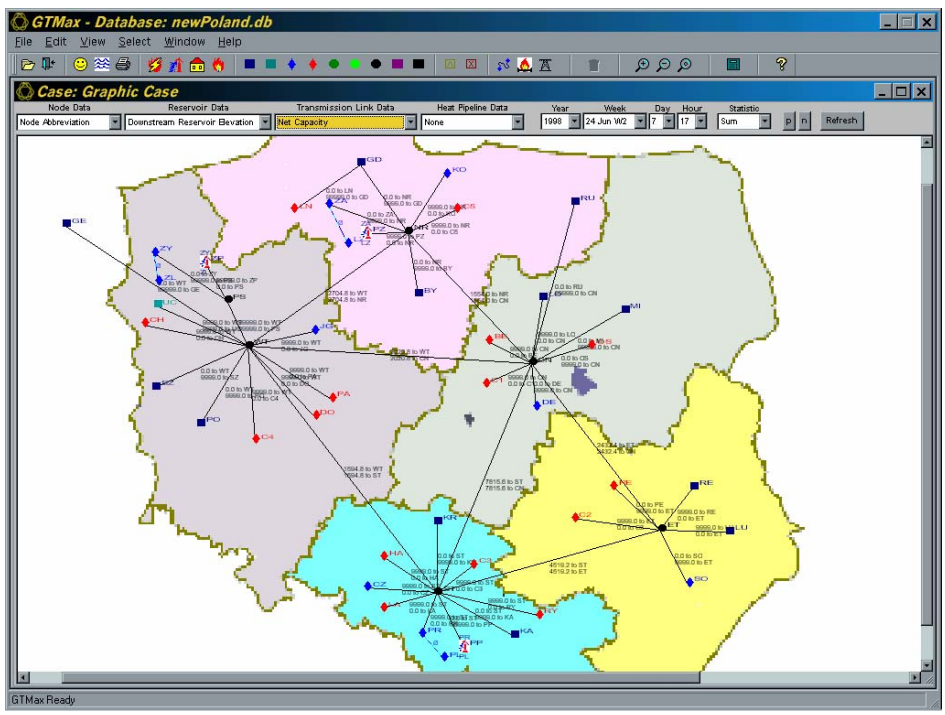


System operators and managers at generation companies around the world must consider many complex and changing physical, environmental, economic, and institutional constraints when determining how to best use their assets and resources.

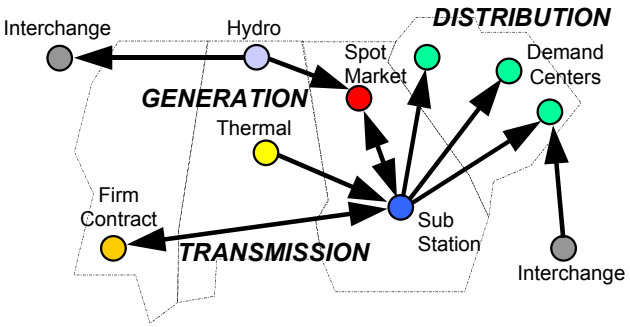
Also, the economic, financial, and reliability benefits of power and energy transactions with neighboring systems and countries will increasingly be of vital interest.

Argonne Approach: Argonne developed the Generation and Transmission Maximization (GTMax) model to study the complex marketing and operational issues in today's deregulated power markets. GTMax helps generation companies and utilities maximize the value of their system assets, taking into account firm and non-firm contracts, independent power producer (IPP) agreements, bulk power transaction opportunities, and limitations of energy and transmission resources.

Sample GTMax Screen Showing System Representation



Capabilities: GTMax simulates regional or national generation and transmission systems. The model maximizes net revenues while ensuring that market transactions and system operations are within physical and institutional limitations. In simulating multiple systems, GTMax identifies utilities and assets that can successfully compete in the market by tracking hourly energy transactions, costs, and revenues.



GTMax employs a user-friendly geographical information system (GIS) interface. Users can point and click on a map of utility power plants and other system components to modify input data and obtain optimization results. A map displays hourly energy flows from supply resources such as generators and IPP firm contract purchases to load centers and spot market delivery points. Energy and financial results are also output in easy-to-understand tables and graphs. GTMax is designed to assist the user in building a network representation of any power system of interest.

Issues Addressed by GTMax:

- Which units will be dispatched in the new market and which will be stranded?
- How much power will I be able to generate and sell each hour during a particular period?
- When should I consider buying and/or selling power in the spot market?
- What is the marginal value of water in my hydro reservoirs?
- What is the value of demand side management programs?
- What is the projected available transmission capability each hour in the region?
- Will my investment in power or transmission assets provide an attractive return?

Applications: The model is currently used by:

- A large U.S. utility company to determine hourly, weekly, and seasonal power and energy offers to customers and fine tune hourly resource generation patterns, spot market transactions, energy interchanges, and power wheeling.
- The U.S. Bureau of Reclamation to compute the economic and financial costs associated with environmental restrictions on hydropower operations.
- A large U.S. energy marketing office to identify operational strategies that optimize the value of company resources while taking advantage of market opportunities.
- A large international power merchant to assess the financial viability of two transmission line projects in the Balkans.
- The Polish Energy Market Agency to estimate the competitiveness of small gas-fired cogeneration in Poland's newly restructured energy markets.
- A large U.S. utility company to compute available transmission capabilities for future postings on regional Open Access Same-time Information Systems (OASIS).

Summary:

- Maximizes company revenues
- Optimizes hydro and thermal generation
- Considers firm contracts and IPP agreements
- Estimates regional economic clearing price of energy
- Simulates spot market transactions
- Quantifies the operational costs and revenues of an IPP
- Models energy exchange agreements
- Operates in convenient GIS interface

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